

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5**

DATE: August 11, 2010

SUBJECT: Comments on Remedial Investigation Report, Matthiessen and Hegeler Zinc Company Site, LaSalle, Illinois. Prepared by Geosyntec Consultants and SulTRAC Inc., May 2010.

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Appendix RA Draft Risk Assessment

1.2.4 Potential Fate and Transport Processes

p. 1-18. If “the contribution of Site groundwater to the overall flow of the LVR has not been determined”, then what is the basis for speculating that it “may be inconsequential”?

1.2.5.2 OU2 Risk Assessment Exposure Areas

Only the last 2 of the 7 OU2 exposure areas are labeled in Fig. RA-1-2.

3.1.1.1.2 Slag Pile

Pioneering vegetation (not understory) includes bladder-campion (*Silene vulgaris*) and an unidentified sedge (*Carex* spp.). It should be noted that “the seeds of sedges ... are eaten by many kinds of wildlife” including songbirds (especially sparrows), upland gamebirds (grouse), rails, ducks, and chipmunks; and foliage is browsed by deer (Martin, et al. 1951). In other words, sedges provide an exposure pathway to wildlife at an early stage of vegetative establishment on the slag pile.

Martin, A., H. Zim and A. Nelson. 1951. American Wildlife & Plants, A Guide to Wildlife Food Habits. reprinted 1961. Dover Publ., New York. 500 p.

Field sparrows (*Spizella pusilla*) also inhabit the site, and feed on a mix of seeds and invertebrates.

3.1.1.1.3 Little Vermilion River

LVR is repeatedly characterized as “the most ecologically relevant habitat associated with the Site”. The meaning of this characterization is unclear. How is aquatic habitat more relevant than terrestrial habitat?

3.1.1.2 OU2 Ecological Habitat Characterization

In soils too young or disturbed to show soil profile development, the presence of reducing soil conditions indicates the soil is hydric (U.S. ACE 1987 Part III 44.d). Unless reducing soil conditions have been shown not to be present, for example, a negative chemical test for the presence of ferrous iron, the hydric soil status of the depressions with hydrophytic vegetation is undetermined.

U.S. ACE. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1 (on-line edition). U.S. Army Corps of Engineers. Waterworks Experiment Station, Vicksburg. <http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf>

Hydric Soils Technical Note 8 http://soils.usda.gov/use/hydric/ntchs/tech_notes/note8.html

3.1.2.1.1 OU1 Potentially Complete Exposure Pathways

The analysis of dermal/inhalation versus oral exposure pathways in EPA (2005b) is not intended to exclude any consideration of dermal or inhalation pathways in BERAs as shown in the following statements (EPA 2005b):

At sites with high VOC and/or certain PAH concentrations in soils with burrowing mammals present, the inhalation exposure pathway should be considered in the baseline ERA. In this case, the contaminants would not be excluded in the screening step.

Exclusion of dermal and inhalation exposure routes for the Eco-SSLs does not preclude their inclusion in the site-specific baseline ERA. If it is expected that receptors may be more exposed to contaminant(s) via dermal and/or inhalation exposures relative to oral exposures due to site-specific conditions, these exposure routes should be evaluated as part of the baseline ERA.

Exclusion of inhalation or dermal pathways should be justified on the basis of the likely uptake pathways for the contaminants at the site, not by a reference to EPA (2005b).

3.3.1.2 Slag Pile SMDP

Phytotoxicity is an ecologically adverse effect. The screening assessment indicates potential for phytotoxic effects, and the phytotoxicity tests are a BERA refinement that support, or do not contradict, the SLERA result.

3.3.2.5 Areas East of the Little Vermilion River SMDP

The screening assessment of limited soil data shows large exceedances of metals screening values. While not part of OU1 or OU2, the screening results do not justify no further evaluation of risk. Unless the contaminants are demonstrated to have come from a non-site source, this area is part of the site and further risk characterization will be required.

3.4.1 OU1 SLERA Conclusions and Recommendations

See comments on 3.3.1.2 (phytotoxicity is an adverse effect) and 3.1.1.1.2 (sedge provides an exposure pathway).

4.1.2.2.2 Study Design for Evaluating AE3 and AE4

Receptor Exposure Assumptions

See comments on Table RA-G4-4. Mink area use factor is underestimated, and the sediment ingestion of the surrogate species for kingfisher is incorrectly reported.

Toxicity Reference Values

The approach for deriving LOAEL TRVs is inconsistent with the intent of the EcoSSL approach for deriving NOAEL TRVs. For the EcoSSLs, the NOAEL TRV is first calculated at the geometric mean of NOAELs from accepted studies. This is a conservative approach because it ensures that the NOAEL TRV will be *lower* than the highest NOAEL in the data base. In a second step, the geometric mean NOAEL will not be selected for the EcoSSL if it is higher than a bounded LOAEL in the toxicity data base (a bounded LOAEL is from a single study reporting both NOAEL and LOAEL values). In other words, if a bounded LOAEL is lower than the geometric mean NOAEL, EcoSSL discards the geometric mean NOAEL as insufficiently protective, and replaces it with a lower and more conservative value that does not exceed *any* bounded LOAEL from accepted studies.

The BERA approach of taking the geometric mean of LOAELs is non-conservative because it ensures that the LOAEL TRV will always be *higher* than the lowest LOAEL values. The geometric mean LOAEL approach is also non-conservative compared to the species sensitivity distribution (SSD) approach for deriving TRVs from synoptic toxicity data. Usually, TRVs based on SSDs are calculated to be protective of 95 % of species, which will always result in a lower value than the geometric mean of the same data set.

Aside from being inherently non-conservative, a secondary issue with this approach is the uncertainty of combining unbounded and bounded LOAELs in the calculation.

The geometric LOAEL TRVs should be replaced with either SSD-derived TRVs protective of 95 % of species, or with the lowest LOAEL from an appropriate study.

An additional point is that the EcoSSL study summaries are secondary literature, and, like all secondary literature, the data cannot be assumed to be 100 % accurate. The original studies for the TRVs that drive important remedial decisions at the site should be reviewed.

4.1.5.2 AE2 – Function and Viability of the Fish Community

Fish abundance is depressed in sample reaches near the site. Based on catch per unit effort (CPUE), Reaches CAR002 and CAR003 have only about one-third of the abundance of fish in Reference Reach CAR004. The pronounced reduction in fish abundance is a line of evidence of ecological impairment near the site.

4.1.7 OU1 BERA Summary and Conclusions

See comment on 4.1.5.2

Conclusions related to food chain modeling may be revised (see comments on 4.1.2.2.2 and Table RA-G4-4).

Table RA-G4-4 Exposure Parameters Used in the Food Chain Model OU1

Mink (6) Home Range: Since the purpose of the mink food chain model is to evaluate aquatic-based exposures, mink range in river length is a more appropriate metric for calculating the area use factor (AUF). The mean 1.85 km length for adult female mink (Gerell 1970) is recommended. Note that the citation for this paper is incorrect in U.S. EPA (1973). The correct citation is:

Gerell, R. 1970. Home ranges and movements of the mink in southern Sweden. *Oikos* 21: 160-173.

Mink (7) Area Use Factor: 1.0 calculated with the equation for Belted Kingfisher (7)

Belted Kingfisher (4) Incidental Sediment Ingestion Rate: Beyer, et al. (1994) report 3.3 % sediment in diet by dry weight for mallard, not 2 %.

4.2.2.2.3 Soil Toxicity Studies

This activity is better described as part of the BERA.

4.2.3.2 Toxicity Reference Value

See comment on 4.1.2.2.2 *Toxicity Reference Values*

Appendix RA-E-S3 OU2 ERA Tables

Soil ingestion rates should be calculated as a fraction of dry-weight food ingestion, not wet-weight food ingestion. The soil-based exposures are overestimated.

Total food ingestion should not be adjusted to account for the soil ingestion component, that is, the total food components should sum to 100 %, and the soil ingestion component added above and beyond. The reason is because the Nagy (2001) regressions for food ingestion are calculated from regressions for field metabolic rate (Nagy, et al. 1999). FMRs are based on the energetics of free-ranging animals, which are converted to food ingestion rates by dividing by the metabolisable energy content of the diet. The food ingestion rates generated by this method are the amounts of food required to provide for the energy used by the field metabolic rate. The calculation does not include extraneous components of the diet, such as soil or sediment, that do

not contribute calories. The food-based exposures are underestimated by inappropriately forcing the combined dietary and soil components to sum to 100 %.

Nagy, K., I. Girard, and T. Brown. 1999. Energetics of free-ranging mammals, reptiles, and birds. *Ann Rev Nutr* 19: 247-77.